Occlusal Disease Revisited: Part I—Function and Parafunction

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This article will address the evolution of occlusal disease from childhood and the deciduous dentition forward. It will include the evolution of anterior wear with emphasis on “cross over” of the mandible. Having classified the types and extent of occlusal disease, new evidence will be shown, on the adult dentition with pathognomonic manifestations, of cross-over or bruxed-braced occlusal disease. Its potential effect on restorative dentistry and dental implants will be discussed. (Int J Periodontics Restorative Dent 2001;21:265–271.)

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The concept of occlusal disease is not well understood by the general population of dentists. As a result, it is not readily recognized, particularly in its early phases. Clinicians normally recognize that a particular person is a “bruxer” if their teeth are badly worn. Unfortunately, this is a late stage of occlusal disease. As a consequence, stress created on the occluding surfaces during bruxism may easily jeopardize existing restorative dentistry or that being contemplated.

About 10 years ago, the first article concerning occlusal disease appeared in this journal. In it, the author defined occlusal disease as a specific disease entity. Obviously, there are other benign entities labeled as disease in and around the oral cavity, notably dental caries, periodontal disease, and diseases of the temporomandibular joint. In the original article, occlusal disease was also shown to be a disease entity. Simply stated, occlusal disease is the process resulting in the noticeable loss or destruction of the occluding surfaces of the teeth. This disease process is primarily, but not
necessarily completely, precipitated by parafunction or bruxism. This nonfunctional activity has already been described extensively.2

The difficulty with the recognition of occlusal disease in its early stages is its subtlety. Often seen in the young and early middle-aged population (particularly in the United States) is what appears to be a relatively small amount of wear combined with a pleasing smile. This is often mistaken for functional wear. Conversely, in some young people, overt occlusal disease is notably present and the pragmatic evidence is obvious. The human species, particularly now, after it has begun food processing, has no need to spend the time chewing food (functional activity) that could cause excessive wear. Thus, parafunctional activity of some type is the most common cause of wear on occluding surfaces—occlusal disease.

It has been suggested that tooth wear is a normal phenomenon. However, it may be natural but not normal. Two cases that do not exhibit significant tooth wear from either bruxism or mastication are shown in Figs 1 and 2. The two men were, respectively, 72 and 74 years of age. These examples tend to belie the concept of attrition as “physiologically normal and necessary for function”3; however, they are rare because occlusal disease in some form is ubiquitous. Again, pragmatic evidence speaks.

Abrahamsen4 has described a number of maladies, including bruxism, that cause loss of tooth structure. He has shown that for each one there is a pattern of destruction that is pathognomonic for its type. This article will focus primarily on the results of bruxism because bruxism is the major cause of occlusal disease.

Part of the occlusal exam

It is imperative that during the initial exam of the patient’s occlusion the patient be encouraged to go through all mandibular movements with the teeth in contact. It is also very important to ask the patient to “match up” or place in contact their upper and lower teeth in a protrusive position, particularly if there is any incisal wear. When the surfaces interdigitate, they are called “mating surfaces” by tribologists, scientists who study lubrication, friction, and wear such as is observed in bruxism. Here, the term matching surfaces will be used for ease of patient communication. During the exam, the patient is asked to match up their front teeth by putting them together protrusively. Patients are often only subconsciously aware of the interdigation of their anterior teeth in a bruxed-braced or “cross-over”
However, they are usually able to locate these matching surfaces in seconds without manipulation by the dentist—intriguing!

The occlusal exam might reveal that individuals may tend to brux only to one side and within the confines of the maxillary anterior teeth (lateral occlusion). Second, they may brux laterally to the left and right. Third, they may brux solely protrusively. Fourth, they may brux in a lateral protrusive pattern or in any combination of these. Fifth, they may cross over, that is, the mandibular anterior teeth are moved beyond the confines of the maxillary teeth. This has been described as a bruxed-braced movement and position.¹ It may be accompanied by a gritting of the teeth as they are braced against each other in this position. There is one remaining important position for cross over. This occurs if and when the mandible is placed in the most extreme protrusive position possible with the anterior teeth beyond any contact. In this instance, only the posterior teeth are touching. Therefore, the maximum stress is on the posterior teeth, particularly in a bracing or clenching mode. In this exaggerated position, the pathognomonic sign is wear primarily on the posterior teeth.

Bruxism is usually a subconscious act during anger, frustration, or physical exertion and often occurs during sleep. The bruxed-braced or cross-over movement and position are more common than previously thought and will be described in more detail. Also, each of these specific patterns tend to be repeated and become habitual.

The evolution of bruxism

Briefly, bruxism does not start in the third, fourth, or fifth decade of life, but starts in childhood as pointed out in the previous article.¹ Further, by the age of 5 or 6, the deciduous dentition is often noticeably compromised, with occlusal disease similar to that of adults (Fig 3). Fortunately, it is replaced by teeth of much more substance, the adult dentition. This, however, allows the wear to appear less obvious and makes it potentially more insidious. We must
therefore watch for occlusal disease in the dentition that is in transition.

In a nearly 12-year-old patient who suffered from partial anodontia, there was severe occlusal disease evidenced on her deciduous dentition (Fig 4a). There were also small incisal-edge notches on her permanent maxillary central incisors. This could easily be mistaken for a childhood accident. However, when asked to match up her front teeth, the abraded mandibular incisors obviously fit perfectly into these notches (Fig 4b). For this patient, occlusal disease could be verified not only in the deciduous dentition, but also in the adult incisors—a continuous process.

Patterns of occlusal disease in anterior teeth

As was noted in the previous article, the anterior teeth are usually the first to show wear in classic bruxism. Posterior occlusal disease appears to be more subtle in its early stages. The anterior teeth are normally the first to contact in eccentric jaw movements because anterior overlap is usually greater than posterior overlap. When wear patterns appear, we are able to predict the direction and end result of the patient’s bruxing habit.

Figure 5a shows an upward slant from mesial to distal on the incisal edges of the maxillary central incisors, a “reverse chevron.” When the patient was asked to move his lower jaw laterally with the teeth in contact, he duplicated his bruxing pattern, a strictly lateral bruxing motion (both left and right). There was no movement of the mandible outside the confines of the maxillary anterior teeth (Figs 5b and 5c). Knowledge of this is particularly important when any intervening restorative dentistry is anticipated. The patient shown here was only 28 years old and had a pleasant smile. There were no other symptoms of oral disease. Because no restorative dentistry was planned for his anterior teeth, we must ask if we can aid the patient in maintaining the status quo. If this is not possible, then as his bruxism continues, he will progress into more advanced occlusal disease for which more demanding dentistry will be required. A carefully constructed occlusal guard for nocturnal wear and biofeedback employed during the day can be most helpful at this stage and keep the treatment minimal and noninvasive.

This individual’s wear pattern was very typical of that seen on a regular basis with more or less tooth structure lost. Here, the incisal guidance still functioned to disclude the posterior teeth. Even when the posterior teeth came into contact, in lateral excursions the mandible
functioned and parafunctioned within the confines of the maxillary teeth. It is very important to establish whether this is the case or if in fact the mandibular teeth move out from under the confines of the maxillary teeth into a crossed-over or bruxed-braced position.

Malpositioned mandibular anterior teeth can cause, with bruxing, irregular wear on maxillary anterior teeth (Fig 6). At this point, the patient must be shown that they are in fact causing the wear with bruxism. The irregularity of wear more readily calls our attention to active occlusal disease than do smooth, evenly worn incisors (ie, Fig 5a). A case for orthodontics to correct the irregularities can be made. However, occlusal guard therapy is still a must for nocturnal protection. A question arises: Could prolonged stress from bruxism contribute to the collapse of mandibular anterior tooth alignment? Any wear, particularly notching, should not be dismissed as accidental. Occlusal disease should be suspected until proven otherwise.

It is intriguing to see in some current publications the restoration with veneers or crowns of obvious cases of anterior occlusal disease. There is rarely a mention of the condition (occlusal disease) or the necessity for occlusal guard protection after the restoration. If only restorative therapy is employed, then will not these new restorations also be subject to failure by bruxism? Knowing this in advance can make complete treatment easier and minimize failure.

Bruxed-braced or cross-over position

Another pathognomonic pattern already mentioned was first called cross over of the anterior teeth by Tanner (Personal communication, 28 Jan 1999). About 35 years ago, he began photographing wear on anterior teeth that would only match up when the mandible was moved outside the confines of the maxilla. Wilson5 has constructed a large articulated teaching model (Fig 7a) of the human dentition that allows us to visualize dramatically the crossing over, or bruxed-braced, position (Fig 7b). We can easily envision any number of possible tooth contacts with movement of the articulated model. If we factor in tooth wear, the possibilities increase dramatically. For
example, Wilson has demonstrated that it is possible for molar contact to be made during cross-over lateral protrusive movement on the non-working side (Fig 7c). This could enhance stress on the temporo-mandibular joint as well as the periodontium and the contacting tooth surfaces. In cross-over bruxing, the fulcrum is moved from the region of the anterior teeth (Class III lever) to the distal-most molar (more approximating a Class II lever), increasing the stress on all related structures. However, the anterior teeth will also suffer wear depending on the frequency and intensity of abuse in crossing over. Figure 7d demonstrates straight protrusive cross over with bilateral molar contact as viewed from the lingual
aspect. This fully extended movement is useful in the examination of every occlusion prior to treatment. Protrusive contact of posterior teeth in the bruxed-braced position is more difficult to see and therefore is more insidious. This will be discussed in more detail in part II of this article.

The patient in Fig 8a demonstrates the opposite anterior wear configuration as the patient in Fig 5a. Here, the wear sloped up mesially on the patient’s maxillary central incisors, and a chevron shape was created on the maxillary incisal edges. This angulation is pathognomonic for left and right cross over of the anterior teeth. When the mandible was moved into left lateral crossed-over position, the maxillary anterior teeth were worn by the mandibular anterior teeth (Fig 8b). In this instance, there was no other incisal protection for the maxillary central incisors as there was in Figs 5b and 5c. The same was true for the right lateral crossed-over position.

References


